

REMARKS

The Present Invention

The present invention relates to a polishing system and composition for use in polishing a substrate, particularly a multi-layer substrate that includes a first metal layer and a second layer. Claims 1-6, 8, 9, 16-27, and 32-35 currently are pending. Applicants note that claim 2 was previously withdrawn from consideration as being directed to a non-elected species; however, in view of the fact that the Office Action sets forth a substantive rejection of claim 2, Applicants discuss claim 2 herein as though such claim has not been withdrawn from consideration by the Office.

Amendments to the Claims

Claim 1 has been amended to recite that the polishing additive is “selected from the group consisting of pyrophosphates, condensed phosphates, diphosphonic acids, tri-phosphonic acids, poly-phosphonic acids, phosphonoacetic acids, and salts thereof, aminoethylethanolamine, polyethyleneimine, imines, imino acids, nitriles, nitros, thioesters, thioethers, carbothiolic acids, carbothionic acids, thiocarboxylic acids, thiosalicylic acids, and mixtures thereof.” Claim 18 has been amended to correct a grammatical error appearing therein. No new matter has been added by way of these amendments.

Summary of the Office Action

The Office Action rejects claims 1, 3, 4, 8, 16, 17, 20, 24-27, and 35 under 35 U.S.C. § 102(e) as allegedly anticipated by U.S. Patent 6,217,416 (Kaufman et al.) (hereinafter “the Kaufman ‘416 patent”). The Office Action also rejects claims 2, 5, 6, 9, 18, 19, 21, 23, and 32-34 under 35 U.S.C. § 103(a) as allegedly unpatentable over the Kaufman ‘416 patent alone or in view of one of the following: U.S. Patent 5,897,375 (Watts et al.) (hereinafter “the Watts ‘375 patent”), U.S. Patent 5,972,792 (Hudson) (hereinafter “the Hudson ‘792 patent”), and U.S. Patent 4,968,381 (Prigge et al.) (hereinafter “the Prigge ‘381 patent”).

Discussion of the Section 102(e) Rejections

As noted above, the Office Action rejects claims 1, 3, 4, 8, 16, 17, 20, 24-27, and 35 as allegedly anticipated by the Kaufman ‘416 patent. Applicants traverse this rejection.

The Kaufman ‘416 patent discloses a first chemical-mechanical polishing slurry comprising an abrasive, an oxidizing agent, a complexing agent, and an organic amino compound (the Kaufman ‘416 patent at col. 3, lines 41-44). The Kaufman ‘416 patent provides that organic amino compounds suitable for use in the first chemical-mechanical polishing slurry include alkylamines (e.g., nonylamine or dodecylamine), alcohol amines

(e.g., monoethanolamine or triethanolamine), amino acids, urea, urea derivatives, and mixtures of the foregoing (the Kaufman '416 patent at col. 6, lines 5-20). The Kaufman '416 patent further provides that the first chemical-mechanical polishing slurry may also comprise a film forming agent, such as benzotriazole (the Kaufman '416 patent at col. 6, lines 27-39). The Kaufman '416 patent also states that the first chemical-mechanical polishing slurry can comprise inorganic additives such as sulfuric acid, phosphoric acid, phosphonic acid, nitric acid, HF acid, ammonium fluoride, ammonium salts, potassium salts, sodium salts or other cationic salts of sulfates, phosphates, phosphonates, and fluorides (the Kaufman '416 patent at col. 10, line 67 – col. 11, line 4).

The Kaufman '416 patent does not disclose a polishing system as defined by the pending claims, as amended, i.e., a polishing system comprising a polishing additive selected from the group consisting of pyrophosphates, condensed phosphates, diphosphonic acids, tri-phosphonic acids, poly-phosphonic acids, phosphonoacetic acids, and salts thereof, aminoethylethanolamine, polyethyleneimine, imines, imino acids, nitriles, nitros, thioesters, thioethers, carbothiolic acids, carbothionic acids, thiocarboxylic acids, thiosalicylic acids, and mixtures thereof. The Kaufman '416 patent fails to even mention, much less disclose a polishing system comprising any of the aforementioned polishing additives. While the Kaufman '416 patent does generally disclose a slurry comprising an "amino organic compound," this general recitation cannot properly be considered to anticipate a claim directed to a system comprising a specific amine-containing compound, such as aminoethylethanolamine. Moreover, neither the general recitation of "alcohol amines" nor the specific examples provided in the Kaufman '416 patent (i.e., monoethanolamine or triethanolamine) can properly be considered to anticipate a polishing system comprising one or more of the polishing additives recited in claim 1.

Furthermore, while the Kaufman '416 patent provides that the disclosed polishing slurry can comprise a suitable inorganic additive, such as phosphonic acid or an ammonium, potassium, sodium, or other cationic salt of a phosphate or a phosphonate, the Kaufman '416 does not disclose diphosphonic acids, tri-phosphonic acids, poly-phosphonic acids, phosphonoacetic acids, pyrophosphates, condensed phosphates, and salts thereof, as recited in the pending claims.

In view of the foregoing, the invention defined by the pending claims cannot properly be considered anticipated by the Kaufman '416 patent. Therefore, the Section 102 rejection over the Kaufman '416 patent is improper and, accordingly, should be withdrawn.

Discussion of the Section 103 Rejections

As noted above, the Office Action rejects claims 2, 5, 6, 9, 18, 19, 21, 23, and 32-34 under 35 U.S.C. § 103(a) as allegedly unpatentable over the Kaufman ‘416 patent alone or in view of the Watts ‘375 patent, the Hudson ‘792 patent, or the Prigge ‘381 patent. Applicants traverse this rejection.

The instant application and the Kaufman ‘416 patent (i.e., U.S. Patent 6,217,416) were, at the time the invention of the instant application was made, owned by or subject to an obligation of assignment to Cabot Microelectronics Corporation. Insofar as the instant application and the Kaufman ‘416 patent were commonly owned at the time the present invention was made, the Kaufman ‘416 patent does not qualify as prior art to the present application under 35 U.S.C. § 102(e) (*see* 35 U.S.C. § 103(c); *see also* M.P.E.P. 706.02(l)(2)).

The Watts ‘375 patent generally discloses a polishing slurry containing an oxidizing agent, a citrate salt, an abrasive, a solvent, and, optionally, a triazole or a triazole derivative (the Watts ‘375 patent at col. 2, lines 26-37). The Hudson ‘792 patent generally discloses a method for the chemical-mechanical planarization of a substrate on a fixed-abrasive polishing pad wherein a planarizing solution is dispensed onto the fixed-abrasive polishing pad. The planarizing solution is an abrasive-free planarizing solution which can contain an oxidant that oxidizes the metal on the surface of the substrate as well as other additives, such as ethanol, nitric acid, benzotriazole, ammonium hydroxide, and ammonium ferricyanide (the Hudson ‘792 patent at col. 2, lines 28-33, and col. 4, lines 50-65). The Prigge ‘381 patent generally discloses a polishing process in which haze-free semiconductor wafers can be obtained in a single-stage process. The disclosed process utilizes a polishing solution which contains one or more compounds having both hydrophilic and hydrophobic groups selected from the group consisting of alcohols, ketones, esters, ethers or amides, and/or which contains less than 0.1% by volume of a surface-active substance (the Prigge ‘381 patent at col. 1, lines 49-57). None of the aforementioned references discloses or suggests a polishing system comprising one of the polishing additives recited in claim 1.

Thus, as implicitly acknowledged in the Office Action, the Watts ‘375 patent, the Hudson ‘792 patent, and the Prigge ‘381 patent, taken alone or in combination, fail to disclose or suggest a polishing system comprising a liquid carrier, at least one oxidizing agent, at least one polishing additive selected from the group recited in claim 1, at least one passivation film forming agent, and a polishing pad and/or an abrasive. Therefore, the invention defined by the pending claims cannot properly be considered obvious over the

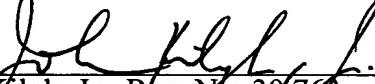
In re Appln. of Wang et al.
Application No. 09/636,161

disclosures of the cited references, taken alone or in combination. Accordingly, the Section 103 rejection should be withdrawn.

Conclusion

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,



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Date: May 24, 2004

Amendment or ROA - Regular (Revised 7/29/03)